Contents

General Information About the Dräger Service Mode SW 2.xx 3

Definition of the Original Status 3

Calibration Functions 4

Reaction in the Event of a Technical Error (TE) 4

Error Messages During a Specific Test 5

Power Supply Low 5

Pressure Low 5

Pressure High 5

Mode Switch Position (AirMix/NoAirMix) 5

Mode Switch Position (IPPV, SIPPV/SIMV, CPAP)
(for Software Versions 3.xx and higher) 6

Software Version 3.xx is Incompatible with Hardware 6

Tests in the DrägerService Mode 7

Starting/Exiting the Customer Service Mode (CSM) 8

Test 001: Adjusting the Language 9

Test 002: Testing the Gas Supply 11

Test 003: Position of the Pneumatic Switch (IPPV, SIPPV/SIMV, CPAP; AirMix/NoAirMix) 12

Test 004: Buzzer Test, LED Test, and LCD Test 13

Test 005: Adjusting and Reading Out the
Potentiometers Freq., VT, TI:TE, and Pmax 14

Starting / Exiting the Extended Service Mode (ESM) 15

Test 011: Calibrating the Pressure Sensors P-Supply
P-AIRMIX and P-LA 16

Test 012: Calibrating the Minute Volume Valve in No Air Mix 18

Software Version 2.xx 19

Software Version 3.xx 20

Test 013: Calibrating the Minute Volume Valve in Air Mix 21

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Contents

Software Version 2.xx 22

Software Version 3.xx 23

Test 014: Adjusting and Displaying the Flow 24

Test 015: Reading in the Analog Channels 27

Test 016: Testing the Autozero Solenoid Valve 31

Test 017: Displaying and Calibrating the Autozero Offset 32

Test 018: Testing the Pressure Sensor Paw and
Triggering the Minute Volume Valve 33

Test 019: Testing the Supply Pressure 35

Test 020: Testing the Minute Volume Valve (Slow) 36

Test 021: Testing the Minute Volume Valve (Fast) 37

Test 022: Testing the Differential Pressure Sensor ΔP and
Testing the Flow Measurement 38

Technical Error (TE) List **40**

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1 General Information About the Dräger Service Mode SW 2.xx

You can operate the DrägerService Mode with the **Info** key and the **Reset** key. These keys allow you to change the set values, to scroll through tests, or to confirm execution of a specific test. The DrägerService Mode is subdivided into the Customer Service Mode (CSM) and the Extended Service Mode (ESM). The working language used throughout the DrägerService Mode is English.

The DrägerService Mode in Oxylog 2000 has 17 tests:

- The first five tests (Test 001 through Test 005) are specifically designed for the customer (CSM), but can also be used by Dräger service technicians.
- The other twelve tests (Test 011 through Test 022) are part of the Extended Service Mode (ESM) which is used to carry out calibrations. These tests are only accessible to Dräger service technicians. To do so, the Dräger service technician must enter a numeric code.

1.1 Definition of the Original Status

Each function in the DrägerService Mode can be carried out separately. At the beginning of the DrägerService Mode and after completion of a specific test, the Oxylog 2000 enters one of the following original status.

Table 1: Original Status of 0xylog 2000 in DrägerService Mode

I:E solenoid valve	off (expiration)
PN solenoid valve	off (PEEP is inactive)
autozero solenoid valve	operates automatically
MV valve	closed
alarm LED	off
buzzer	off
LCD backlight	on
alarms	deactivated

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1.2 Calibration Functions

The following table lists the four calibration functions available in the DrägerService Mode. The data is stored in the EEPROM:

Table 2: Calibration Functions in the DrägerService Mode

No.	Function	Mode	Test No.
1	adjusting the language	CSM/ESM	001
2	calibrating the pressure sensors (P-Vers, P-AIRMIX, P_LA)	ESM	011
3	calibrating the minute volume valve	ESM	012, 013
4	calibrating the autozero offset	ESM	017

Caution:

After installing a new Control PCB, carefully follow the steps for calibrating (nos. 1 through 4) specified in the table above.

After installing a new Sensor PCB, perform Test 011 “Calibrating the Pressure Sensors P-Supply and P-LA”.

1.3 Reaction in the Event of a Technical Error (TE)

If Oxylog 2000 detects a technical error, it will show the error number on the display. The technical error and the name of the current test are displayed alternately at 2-second intervals. In the event of a technical error, all tests can be carried out normally. The message on the display disappears as soon as the technical error has been corrected.

A new Control PCB will generate the error No. 16 (invalid check sum in the EEPROM) before initial calibration. This technical error will disappear as soon as all data has been calibrated.

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1.4 Error Messages During a Specific Test

If the system detects and displays an error, you must confirm this error by pressing the **Info** key and the **Reset** key simultaneously. Once the error has been removed, specific tests can be selected and carried out again.

All potential errors and their causes are listed below:

1.4.1 Power Supply Low

Problem: battery empty	No external power supply connected. The internal power supply is no longer sufficient for safe operation.

1.4.2 Pressure Low

Problem: pressure low	Gas supply pressure is too low.

1.4.3 Pressure High

Problem: pressure high	A gas supply source is connected although no pressure is required for this test.

1.4.4 Mode Switch Position (AirMix/NoAirMix)

Problem: NoAirMix !	The mode switch is not in the correct position.

or

Problem: AirMix	The mode switch is not in the correct position.

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1.4.5 Mode Switch Position (IPPV, SIPPV/SIMV, CPAP) (for Software Versions 3.xx and higher)

Problem: pos. SIMV/CPAP	The mode switch is not in the correct position.

1.4.6 Software Version 3.xx is Incompatible with Hardware

Problem: Hardware is incompatible.	Software Version 3.xx is not compatible with the hardware being used.

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1.5 Tests in the DrägerService Mode

Table 3: DrägerService Mode Tests

Test number	Test Name	Mode
001	Adjust Language	CSM
002	Supply Pressure	CSM
003	Mode Switch	CSM
004	Buzzer & LED Test	CSM
005	Adjust Freq., V_T, T_I:T_E, Pmax	CSM
006 to 010	not assigned	
011	Calibration PSWI	ESM
012	Calibration MV Valve NoAirMix	ESM
013	Calibration MV Valve AirMix	ESM
014	Flow Set & Measure	ESM
015	Analog Input	ESM
016	Test Autozero Valve	ESM
017	Autozero Meas & Cal.	ESM
018	Set MV Valve, Paw	ESM
019	Meas. Supply Pressure	ESM
020	Test MV Valve Slow	ESM
021	Test MV Valve Fast	ESM
022	Flow Measurement	ESM
023-255	not assigned	

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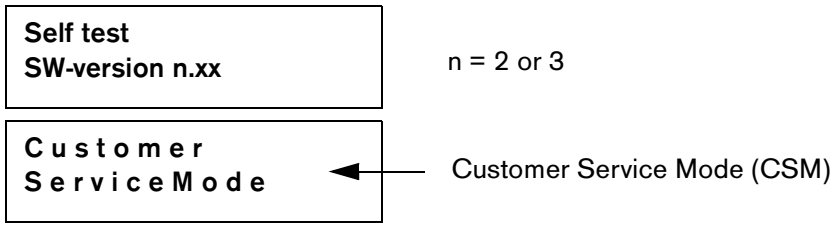
2 Starting/Exiting the Customer Service Mode (CSM)

Important:

In the Customer Service Mode (CSM), only Test 001 through Test 005 are accessible to the customer or Dräger service technician. The other tests are deactivated.

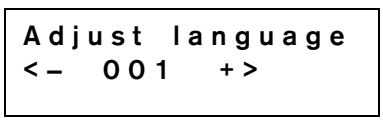
- Turn the potentiometers for frequency **Freq.** and for tidal volume $\mathbf{V_T}$ clockwise as far as they will go.
- Press and hold the **Info** key and the **Reset** key simultaneously and switch on the Oxylog 2000.

Display:



- Release the two keys.

Display:



- Press the **Reset** key or the **Info** key to select Test 001 through Test 005.
- Press the **Reset** key and the **Info** key simultaneously to activate the respective test.
- Press the **Reset** key and the **Info** key simultaneously again to return to the Customer Service Mode (CSM).

Exiting the Customer Service Mode (CSM)

- Switch Oxylog 2000 off and on again to return to the normal operating mode.

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2.1 Test 001: Adjusting the Language

This test allows you to adjust the language to be used during operation.

- Press the **Info** key and the **Reset** key simultaneously to activate Test 001.
- Press the **Reset** key to select the desired language.

Display:

or

or

or

or

or

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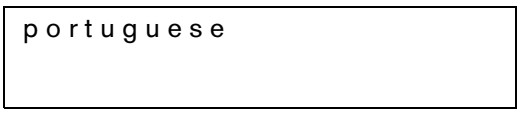
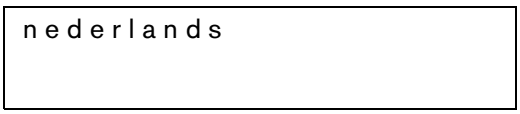
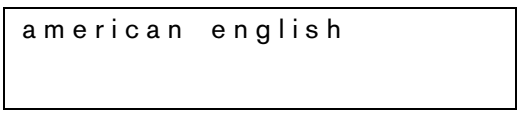


or

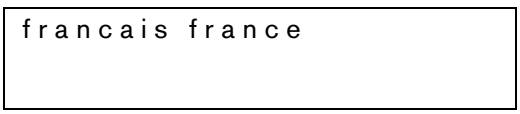
or



or



or



- Press the **Info** key and the **Reset** key simultaneously to adjust the language as desired.

Oxylog 2000 returns automatically to the Customer Service Mode (CSM).

Exiting the Customer Service Mode (CSM)

- Switch Oxylog 2000 off and on again to return to the normal operating mode.

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2.2 Test 002: Testing the Gas Supply

This test allows you to test the gas supply.

- Press the **Reset** key to select Test 002.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 002.

Display:

Pressure high

The gas supply pressure is sufficient.

- Disconnect the Oxylog 2000 from the gas supply.
- Set the NoAirMix/AirMix mode selector switch to the centre position in order to vent the residual pressure.

Display:

Pressure low

The gas supply pressure is too low or the device is not connected to a gas supply source.

- If problems occur during this test, first calibrate the pressure sensors (Test 11 in the Extended Service Mode ESM)
- Press the **Info** key and the **Reset** key simultaneously to return to the Customer Service Mode (CSM).

Exiting the Customer Service Mode (CSM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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2.3 Test 003: Position of the Pneumatic Switch (IPPV, SIPPV/SIMV, CPAP; AirMix/NoAirMix)

This test allows you to check positions of the IPPV, SIPPV/SIMV, CPAP and AirMix/NoAirMix mode switch. The respective position is shown on the Oxylog 2000 display. SIPPV is only available with software version 3.xx.

- Press the **Reset** key to select Test 003.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 003.

Display:

Pos. NoAirMix Pos. IPPV, SIPPV

or

Pos. NoAirMix Pos. SIMV,CPAP

or

Pos. AirMix Pos. SIMV,CPAP

or

Pos. AirMix Pos. IPPV, SIPPV

- Press the **Info** key and the **Reset** key simultaneously to return to the Customer Service Mode (CSM).

Important!

If the pressure in the device is too low, or if the device is not connected to a gas supply source, the warning **"Problem: pressure low"** will appear. In this case, Test 003 must be cancelled (press the **Info** key and the **Reset** key simultaneously), the device be connected to a gas supply source, and the Test 003 selected again.

Exiting the Customer Service Mode (CSM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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2.4 Test 004: Buzzer Test, LED Test, and LCD Test

This test allows you to check the audible and visible signals. The LEDs of the internal/external power supply, the alarm LED and the backlight of the display come on.

- Press the **Reset** key to select Test 004.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 004.

Display:

LCD_HG	Test ON
RESET	Test OFF

- Press the **Info** key to start Test 004.

The buzzer is activated and the pixels of the display are triggered.

- Press the **Reset** key to stop Test 004.
- Press the **Info** key and the **Reset** key simultaneously to return to the Customer Service Mode (CSM).

Exiting the Customer Service Mode (CSM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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2.5 Test 005: Adjusting and Reading Out the Potentiometers Freq., VT, T_I:T_E, and Pmax

This test allows you to compare the positions of the potentiometers Freq., VT, T_I:T_E and, Pmax with the values shown on the display.

- Press the **Reset** key to select Test 005.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 005.
- Adjust the values listed in the table below using the potentiometer and check the values shown on the display.

Display:

F = X X. XX	V T = X . X X X
I E= X : X.XX	P = X X . X

Table 4: Potentiometer settings: Freq., VT, TI:TE and Pmax

Potentiometer setting		**Value displayed by Oxylog 2000 (tolerances)**	
VT	0,1 L 0,8 L 1,5 L	0.095 to 0.15 L 0.79 to 0.81 L 1.45 to 1.55 L	< adjustment
Frequency	5 1/min 10 1/min 40 1/min	5.00 to 5.15 1/min 9.88 to 10.07 1/min 39.5 to 40.05 1/min	< adjustment
I:E	1:3 1:1.5 2:1	1:2.9 to 1:3.0 1:1.4 to 1:1.6 1.9:1 to 2.0:1	< adjustment
Pmax	20 mbar 40 mbar 60 mbar	20.0 to 20.5 mbar 39.6 to 40.4 mbar 59.4 to 60.0 mbar	< adjustment

- Press the **Info** key and the **Reset** key simultaneously to return to the Customer Service Mode (CSM).

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Exiting the Customer Service Mode (CSM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

3 Starting / Exiting the Extended Service Mode (ESM)

In addition to the tests in the Customer Service Mode (CSM) (Test 001 through 005), you have access to the twelve tests in the Extended Service Mode (ESM) (Test 011 through Test 022). The remaining Tests 023 through 255 are not assigned. To start the Extended Service Mode (ESM), you must enter a specific numeric code.

- Turn the potentiometers for the frequency **Freq.** and the tidal volume **VT** clockwise as far as they will go.
- Press and hold the **Info** key and the **Reset** key simultaneously and switch on the Oxylog 2000.

Display:

Self test **SW-version n.xx**

n = 2 or 3

Customer **Service–Mode**

← Customer Service Mode (CSM)

- Release the **Info** key and the **Reset** key.

A d j u s t l a n g u a g e **< – 0 0 1 + >**

- Adjust the number “222” using the **Info** key or the **Reset** key.
- Press the **Info** key and the **Reset** key simultaneously for approx. 5 seconds to start the Extended Service Mode (ESM).

Extended Dräger **Service–Mode**

- Select the desired test with the **Info** key or the **Reset** key.
- Press the **Info** key and the **Reset** key simultaneously to activate the desired test.
- Press the **Info** key and the **Reset** key simultaneously again to return to the Extended Service Mode (ESM).

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Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

3.1 Test 011: Calibrating the Pressure Sensors P-Supply P-AIRMIX and P-LA

This test allows you to calibrate the Oxylog 2000 pressure sensors. Proceed as follows:

- Disconnect the Oxylog 2000 from the gas supply.
- Adjust the mode switch to **IPPV**.
- Adjust the mode selector switch AirMix/NoAirMix to **Air Mix** position.
- Adjust the **PEEP potentiometer** to 0 mbar.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 011.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 011.

Display:

```
Remove Pressure!
```

- Press the **Info** key and the **Reset** key simultaneously.

The pressure sensors are exposed to atmospheric pressure. The I:E valve switches over to inspiration and, at the same time, opens the minute volume valve.

```
CalibrationP_LA

P_VERS  P_AIR_MIX
```

The Offsets of the pressure sensors are then stored in the EEPROM.

- As soon as the pressure has been built up in the system, press the **Info** key and the **Reset** key simultaneously to store the calibration values.

The Oxylog 2000 returns automatically to the Extended Service Mode (ESM).

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Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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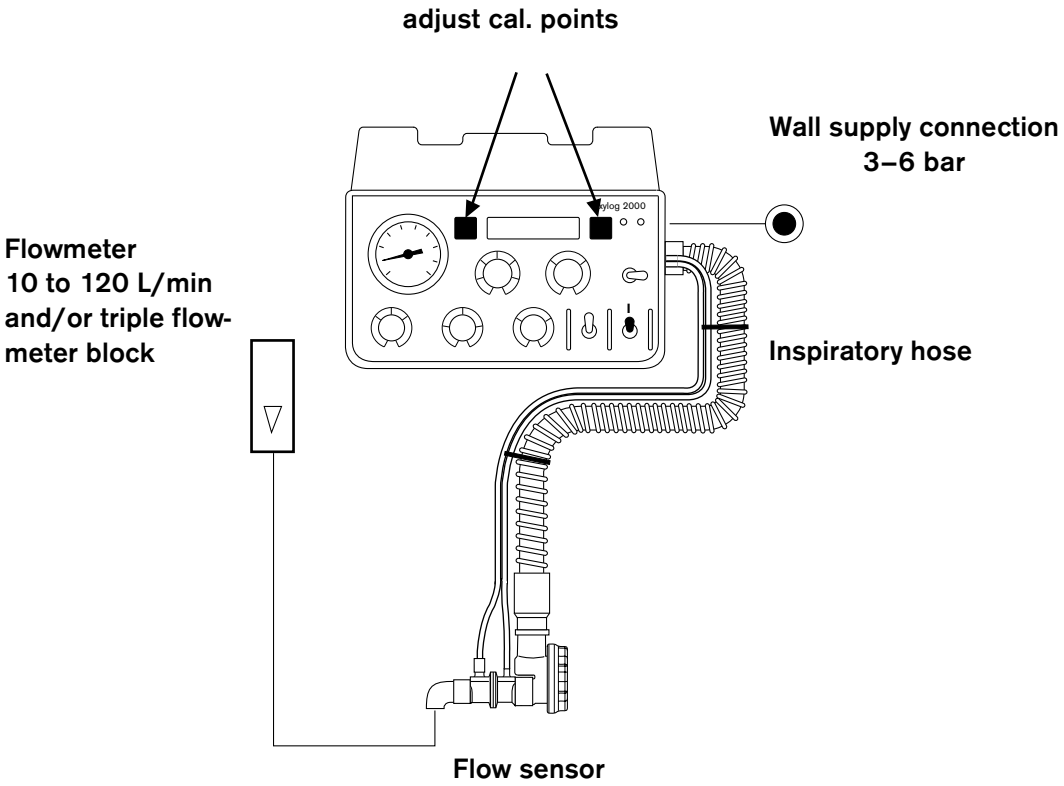
3.2 Test 012: Calibrating the Minute Volume Valve in No Air Mix

During the calibration sequence (Test 012), you will be prompted to perform specific steps. The displayed flow value (Nom.) is the calibration point. At the beginning of calibration, the most recent stored flow value is adjusted. You can change this value by pressing the **Reset** key or the **Info** key. You cannot stop the calibration process, once it has started.

At each calibration point, you must adjust the flow by pressing the **Info** key or the **Reset** key so that the value shown on the display matches those given in the steps for calibration.

Test Setup



- Adjust the mode switch to **IPPV**.
- Adjust the mode selector switch AirMix/NoAirMix to **No Air Mix** position.
- Set the selector switch PEEP/CPAP to 0 mbar.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 012.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 012.

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Important:

Allow the Oxylog 2000 to stabilize at each calibration point. Watch the corresponding scale (Air or O_2) on the flowmeter.

3.2.1 Software Version 2.xx

Display:

NoAirMix = 1 5 L / m i n ENTER = c a l. P o i n t	1st calibration point: 14.5 bis 15.5 L/min

- If necessary, press the **Info** key or the **Reset** key to adjust the flow such that the value shown on the display matches that indicated on the external flow meter (14.5 to 15.5 L/min).
- Press the **Info** key and the **Reset** key simultaneously.

The Oxylog 2000 displays the second calibration point (60 L/min) and delivers the respective flow.

Display:

NoAirMix = 6 0 L / m i n ENTER = c a l. P o i n t	2nd calibration point: 60 ±1 L/min

- If necessary, press the **Info** key or the **Reset** key to adjust the flow such that the value shown on the display matches that indicated on the external flow meter (59 to 61 L/min).
- Press the **Info** key and the **Reset** key simultaneously to store the second calibration point in the EEPROM.

The second calibration point is calibrated and the Oxylog 2000 returns automatically to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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3.2.2 Software Version 3.xx

Display:

Set Pmax = 60 mbar. 0 mbar pressure

- Set the mode switch for Pmax to 60 mbar.
- Press the **Info** key and the **Reset** key simultaneously to start the calibration mode.

NoAirMix xx L/min ENTER = calibration point

Press the **Info** key or the **Reset** key to set the flow so that the value shown on the display screen matches the value measured on the external flowmeter.

Press the **Info** key and the **Reset** key simultaneously to save the following calibration values in the EEPROM.

Calibration Value	Tolerances for Set Flow Values
10	9.5 - 10.5 L/min
20	19.0 - 21.0 L/min
30	29.0 - 30.0 L/min
50	49.0 - 51.0 L/min
60	59.0 - 60.0 L/min

The last calibration value is calibrated. Oxylog 2000 automatically returns to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM)

- If it is switched off and then on again, Oxylog 2000 returns to normal operation.

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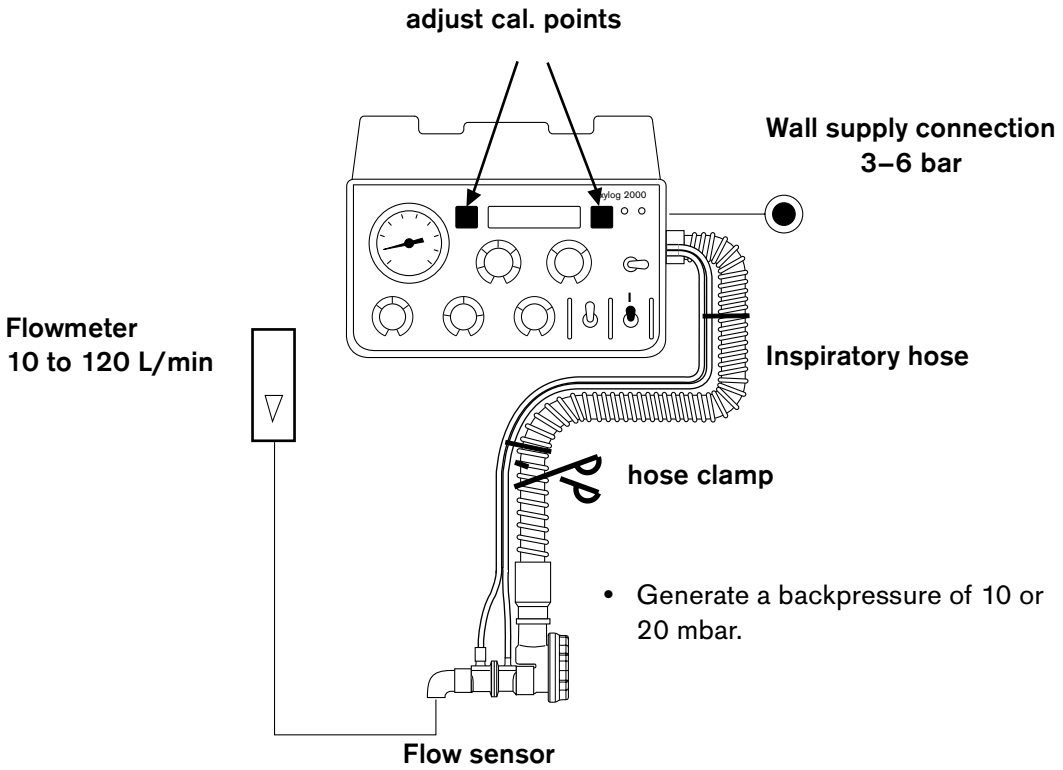
3.3 Test 013: Calibrating the Minute Volume Valve in Air Mix

During the calibration sequence (Test 013), you will be prompted to perform specific steps. The displayed flow value (Nom.) is the calibration point. At the beginning of calibration, the most recent stored flow value is adjusted. You can change this value by pressing the **Reset** key or the **Info** key. You cannot stop the calibration process, once it has started.

At each calibration point, you must adjust the flow by pressing the **Info** key or the **Reset** key such that the value shown on the display matches that indicated on the external flow meter.

Test Setup



- Adjust the mode switch to **IPPV**.
- Adjust the AirMix/NoAirMix mode selector switch to **Air Mix** position.
- Set the selector switch for PEEP/CPAP to 0 mbar.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 013.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 013.

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Important:

Allow the Oxylog 2000 to stabilize at each calibration point. Watch the corresponding scale (Air or O_2) on the flowmeter.

3.3.1 Software Version 2.xx

Display:

```
AirMix =  XX L / m i n

ENTER = c a l.  P o i n t
```

- If necessary, press the **Info** key or the **Reset** key to adjust the flow such that the value shown on the display matches that indicated on the external flow meter.
- Press the **Info** key and the **Reset** key simultaneously to store the points (see the following table) in the EEPROM.

Calibration values	Tolerance of the set flow values	Backpressure
10 L/min	9.5 – 10.5 L/min	10 mbar
40 L/min	39 – 42 L/min	20 mbar
50 L/min	49 – 51 L/min	20 mbar
60 L/min *	59 – 61 L/min	20 mbar
70 L/min *	69 – 71 L/min	20 mbar

* If the calibration value (70 L/min) is not obtained, store the highest calibration value.

The last calibration point is calibrated. Oxylog 2000 returns automatically to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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3.3.2 Software Version 3.xx

Display:

Set Pmax = 60 mbar. 20 mbar pressure

- Set the selector switch for Pmax to 60 mbar.
- Press the **Info** key and the **Reset** key simultaneously to begin calibrating.

AirMix	xx L/min
ENTER = calibration	

In order to improve the performance of the injector, the I:E valve is set to switch back and forth: 8 seconds on and 0.5 seconds off.

- Press the **Info** key and the **Reset** key to set the flow so that the value displayed on the screen matches the value measured on the external flowmeter.
- Press the **Info** key and the **Reset** key simultaneously to save the following calibration values in the EEPROM.

Calibration Value	Tolerances for Set Flow Values	Backpressure
10	9.5 - 10.5 L/min	20 mbar
20	19.0 - 21.0 L/min	20 mbar
30	29.0 - 30.0 L/min	20 mbar
40	39.0 - 41.0 L/min	20 mbar
50	49.0 - 51.0 L/min	20 mbar
60	59.0 - 61.0 L/min	20 mbar

The last calibration point is calibrated. Oxylog 2000 returns automatically to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM)

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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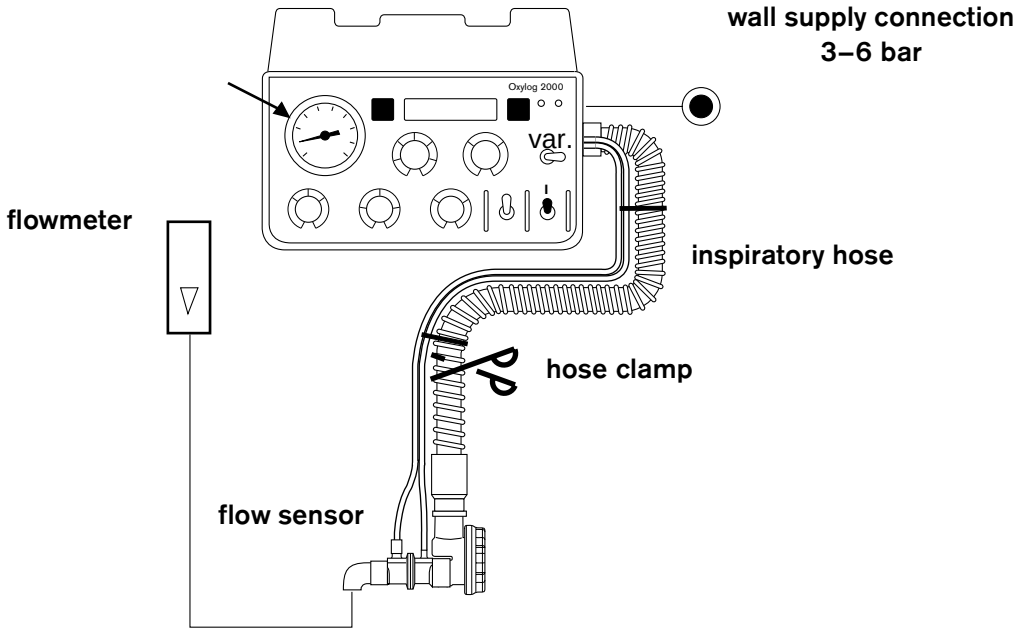
3.4 Test 014: Adjusting and Displaying the Flow

This test allows you to adjust the flow in steps of 100 mL. The measured flow is continually displayed.

The I:E valve is switched on at the beginning of the test and switched off again at the end of the test.

Test Setup



- **Generate a backpressure of 10 or 20 mbar.**

Important!

In the Air Mix mode, generate a backpressure (e.g. using a hose clamp) in order to supply the appropriate flow.

- Adjust the mode switch to **IPPV**.
- Set the selector switch for PEEP/CPAP to 0 mbar.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 014.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 014.

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Display:

Nom. = XX.X L/min
Act. = +XX.X L/min

Flow range

Air Mix 4 to 60 L/min
No Air Mix 4 to 60 L/min

- Adjust the flow values (nom.) with the **Reset** key (see the following table) and check the display (act.) on Oxylog 2000 using an external flowmeter.

Tabelle 5: Flow Settings for Software Version 2.xx

AirMix	Set Flow (nom.)	Flowmeter	Backpressure
	10 L/min	9 to 11 L/min	10 mbar
	40 L/min	36.8 to 43.2 L/min	20 mbar
	50 L/min	46.0 to 54.0 L/min	20 mbar
	60 L/min	55.2 to 64.8 L/min	20 mbar
	70 L/min	61.0 to 75.6 L/min	20 mbar
NoAirMix	15 L/min	13.5 to 16.5 L/min	no backpressure
	60 L/min	55.2 to 64.8 L/min	no backpressure

Table 6: Flow Settings for Software Version 3.xx

AirMix	Set Flow (nom.)	Fowmeter	Backpressure
	10	9.0 to 11.0 L/min	20 mbar
	20	18.0 to 22.0 L/min	20 mbar
	30	27.6 to 32.4 L/min	20 mbar
	40	36.8 to 43.2 L/min	20 mbar
	50	46.0 to 54.0 L/min	20 mbar
	60	55.2 to 64.8 L/min	20 mbar
NoAirMix	10	9.0 to 11.0 L/min	no backpressure
	20	18.0 to 22.0 L/min	no backpressure
	30	27.6 to 32.4 L/min	no backpressure
	50	46.0 to 54.0 L/min	no backpressure
	60	55.2 to 64.8 L/min	no backpressure

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Important!

If the values shown in the flow setiings table are not reached, then carry out Test 012 and Test 013.

- Press the **Info** key and the **Reset** key simultaneously to finish Test 014.

The Oxylog 2000 automatically returns to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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3.5 Test 015: Reading in the Analog Channels

You can display the desired analog channel by pressing the **Info** key or the **Reset** key. The displayed measured value is continually re-calculated. A total of eighteen values are displayed. The measured value is shown in LSB (1023 LSB correspond to 5.0 V).

- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 015.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 015.

Caution:

The values shown in the following table apply to an operational Oxylog 2000 equipped with a fully charged and connected rechargeable battery pack.

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Table 7: Designation of the Analog Channels

No.	Designation	Remark
1	POTI _PMAX	Front potentiometer, max. ventilation pressure.
2	POTI_IE	Front potentiometer, inspiratory time.
3	POTI_VT	Front potentiometer, tidal volume.
4	POTI_F	Front potentiometer, frequency.
5	POTI_MV	Potentiometer for definition of the MV valve's position.
6	P_ FLOW	Differential pressure of the flow measurement.
7	P_AW	Airway pressure.
8	KONTR_ VPSCHALT	Switched 5 V voltage supply.
9	KONTR_ VPFLOW	Supply voltage 11 V.
10	KONTR_ VPAW	Supply voltage 10 V.
11	KONTR_ VBAT	Bat supply voltage from rechargeable-battery or normal battery pack.
12	KONTR_ VEXT	External power supply.
13	KONTR_VALMN	Power supply (batteries).
14	KONTR_5 V	Internal 5 V of power supply.
15	P_VERSORGUNG	Supply pressure sensor.
16	P_AIR_MIX	Mode selector switch AirMix/NoAirMix.
17	P_LA	Lung demand valve, pressure-supply sensor.
18	AKKU_TEMP	Temperature-sensor rechargeable battery.

Display:

```
POTI_PMAX
XXX(X.XXX V)
```

Left potentiometer stop: < 0.5 V
Right potentiometer stop: approx. 4.5–5.0

```
POTI_IE
XXX(X.XXX V)
```

Left potentiometer stop: < 0.5 V
Right potentiometer stop: approx. 4.5–5.0

```
POTI_VT
XXX(X.XXX V)
```

Left potentiometer stop: < 0.5 V
Right potentiometer stop: approx. 4.5–5.0

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POTI_F XXX(X.XXX V)	Left potentiometer stop: < 0.5 V Right potentiometer stop: approx. 4.5–5.0
POTI_MV XXX(X.XXX V)	This value is calculated from the position of the MV valve. (This value isn´t defined).
P_FLOW XXX(X.XXX V)	Unpressurized 2.5 V ±150 mV.
P_AW XXX(X.XXX V)	Unpressurized 0.9 V ±0.1 V (offset).
KONTR_VPSCHALT XXX(X.XXX V)	Supply voltage 5 V (tolerance: ±0.2 V)
KONTR_VPLOW XX(X.XXX V)	Supply voltage 11 V (tolerance: ±1.0 V)
KONTR_VPAW XXX(X.XXX V)	Supply voltage 10 V (tolerance: ±1.0 V)
KONTR_VBAT XXX(X.XXX V)	Supply voltage Internal NiCd battery (approx. 9 V)
KONTR_VEXT XXX(X.XXX V)	Ext. supply voltage 12 V (tolerance: ±1 V)
KONTR_VALMN XX(X.XXX V)	Supply voltage 5 V (tolerance: ±0.1 V) Internal AlkMn batteries **or** < 1 V if Internal AlkMn battery pack isn´t installed.
KONTR_5V XXX(X.XXX V)	Monitoring 5 V (tolerance: ±0.25 V)

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P_VERSORGUNG XXX(X.XXX V)

Pressure sensor (P-supply):
(back pressure of the pressure regulator)

The indicated value **X.XXX V** corresponds to the calculated background of the pressure regulator (in volts).
Background = indicated value minus the offset (1 bar is equivalent to approx. 460 mV)

Offset = value indicated while the gas supply is disconnected

Example:

- Disconnect gas supply.
- Note the Offset-Value of the voltage (0.64 V).
- Connect gas supply.
- Note the measured value of the voltage (1.456 V).
- Formula:
  pressure result in Volt (1.456 V) – Offset value (0.64 V) = 0.816 V.
- Formula:
  0.816 V : 0.460 V (fixed value) <–> 1.773 bar (back pressure of the pressure regulator).

P_AIR_MIX XXX(X.XXX V)

Mode selctor switch AirMix/NoAirMix:
Air Mix position ca. 0.6 V
No Air Mix position ca. 2 V

P_LA XXX(X.XXX V)

Mode switch at position IPPV (< 2 V).
Mode switch at position SIMV (> 2 V).

AKKU_TEMP XXX(X.XXX V)

Rechargeable-battery temperature sensor (NTC)
Charging/temperature monitoring

- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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3.6 Test 016: Testing the Autozero Solenoid Valve

This test allows you to check the function of the Autozero solenoid valve. You can hear the switching sound of the Autozero solenoid valve. You can measure the valve voltage directly at the Autozero solenoid valve. It should be 6 V ±0.5 V. You do not need to connect the device to a gas supply to perform this test.

- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 016.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 016.

Display:

```
INFO: P o s  A C T I V E

RESET: P o s  I N A C T
```

- Press the **Info** key to switch on the Autozero solenoid valve.

```
Pos.  A C T I V E

RESET: P o s  I N A C T
```

- Press the **Reset** key to switch off the Autozero solenoid valve.

```
Pos.  I N A C T I V E

INFO: P o s . A C T I V E
```

- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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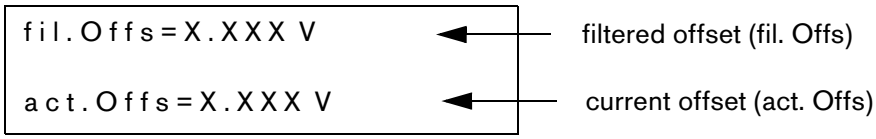
3.7 Test 017: Displaying and Calibrating the Autozero Offset

In the IPPV mode, the Oxylog 2000 ventilates the patient with the frequency (**Freq.**), the tidal volume (V_T), and the inspiratory time (T_I:T_E) values. The alarm messages are not active. The current offset (act. Offs) of the flow-measurement pressure sensor (Autozero) is displayed continually in the lower section of the display. The filtered offset (fil. Offs) is indicated in the top line of the display. The filtered offset compensates for the occurring fluctuations and has a greater stability. A new Autozero value is calculated at one to two minute intervals.

- Adjust the mode switch to **IPPV**.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 017.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 017.

Display:



- Press the **Reset** key to calibrate the default offset (2.5 V).

The filtered offset (fil. Offs) and the current offset (act. Offs) have the same voltage value. The voltage should be approx. 2.5 V.

- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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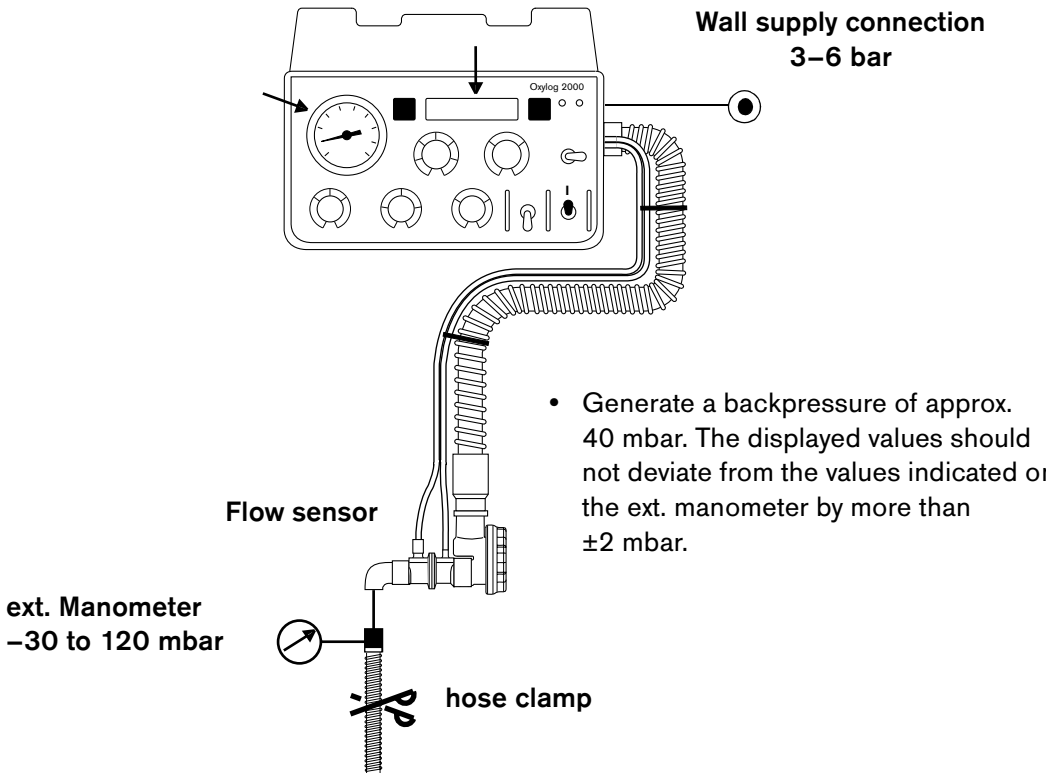
3.8 Test 018: Testing the Pressure Sensor Paw and Triggering the Minute Volume Valve

No control of the minute capacity valve occurs in this test. If no key is pressed, the motor will stop. You can open or close the minute volume valve by pressing the **Info** key or the **Reset** key.

Caution:

The minute volume valve might get stuck. To avoid this, do not move the minute volume valve completely to its mechanical stops. Carefully open or close the minute volume valve.

Test Setup


Wall supply connection
3–6 bar
Oxylog 2000
• Generate a backpressure of approx. 40 mbar. The displayed values should not deviate from the values indicated on the ext. manometer by more than ±2 mbar.
Flow sensor
ext. Manometer
–30 to 120 mbar
hose clamp

- Set the mode switch to **IPPV**.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 018.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 018.

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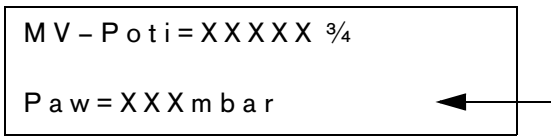
- Press the **Info** key or the **Reset** key to open or close the minute volume valve.

Display:



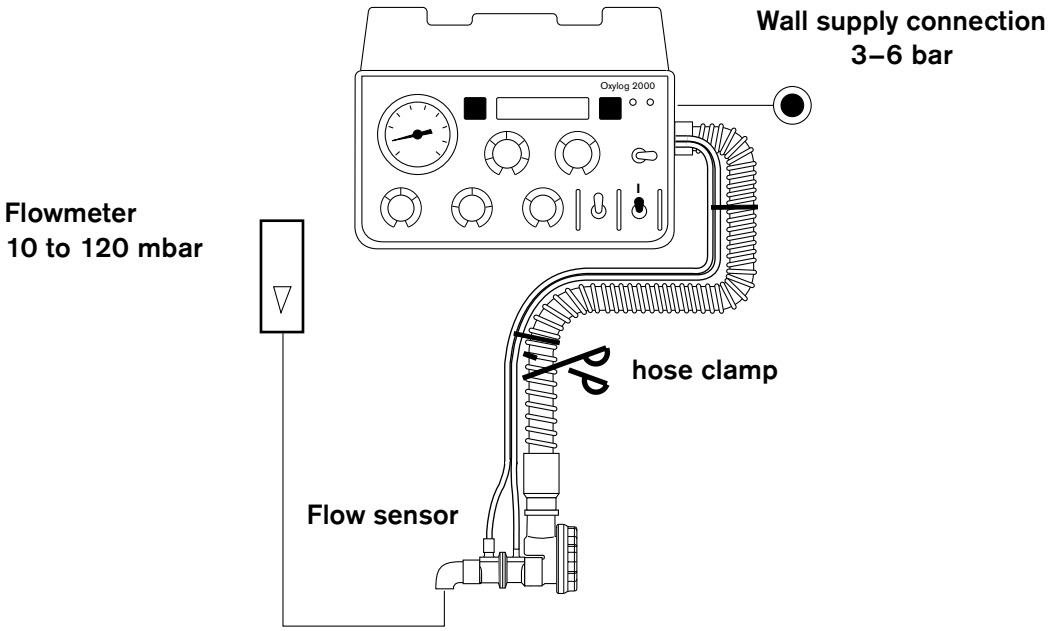
Measured value of the Paw pressure sensor (mbar)

- Adjust a small flow with the **Reset** key.
- Adjust a pressure of 40 mbar via an external manometer using a hose clamp.

The Oxylog 2000 displays a ventilation pressure of 40 mbar ±2 mbar.

With this function, you may also check the injector. In the No Air Mix switch position a defined, externally measured flow is adjusted. After switchover to the Air Mix position, the MV valve is in the same opening position. The external flow meter displays a flow increased by the injector. The flow difference corresponds to the additional flow through the injector at the selected operating point.

Test Setup



- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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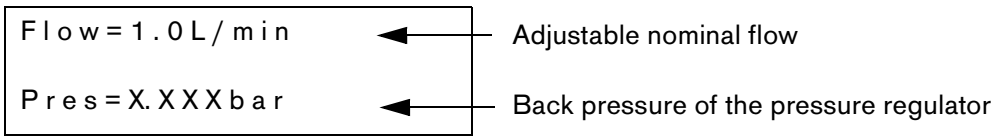
3.9 Test 019: Testing the Supply Pressure

During this test, the minute volume valve delivers an adjustable nominal flow. This nominal flow is indicated in the top line of the display. The specified flow can be adjusted in 100 mL steps using the **Info** key or the **Reset** key.

The pressure measured downstream of the pressure regulator is shown on the bottom line of the display. The influence of an increasing flow on the internal pressure is observable.

- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 019.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 019.

Display:



- Press the **Reset** key and adjust a flow of 40 L/min.

The Oxylog 2000 displays a value of approx. 2.4 bar.

- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

Important:

Alarm message: Pressure low.

If the measured pressure falls below the alarm limit, the test is aborted and the alarm **Pressure low** is given.

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3.10 Test 020: Testing the Minute Volume Valve (Slow)

During this test, the minute volume valve control is switched off. The minute volume valve can be opened or closed **slowly** by hand.

Caution:

The minute volume valve might get stuck in the mechanical stop. To avoid this, do not move the minute volume valve completely to its mechanical stops. Open or close the minute volume valve carefully.

- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 020.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 020.

Display:

```
LCD_HG   M V  c l o s e

RESET    M V  o p e n
```

- Press the **Info** key to slowly close the minute volume valve.
- Press the **Reset** key to slowly open the minute volume valve.
- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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3.11 Test 021: Testing the Minute Volume Valve (Fast)

During this test, the minute volume valve control is switched off. The minute volume valve can be opened or closed **fast** by hand.

Caution:

The minute volume valve might get stuck in the mechanical stop. To avoid this, do not move the minute volume valve completely to its mechanical stops. Open or close the minute volume valve carefully.

- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 021.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 021.

Display:

```
LCD_HG   MV close

RESET    MV open
```

- Press the **Info** key to fast close the minute volume valve.
- Press the **Reset** key to fast open the minute volume valve.
- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch the Oxylog 2000 off and on again to return to the Oxylog 2000 normal operating mode.

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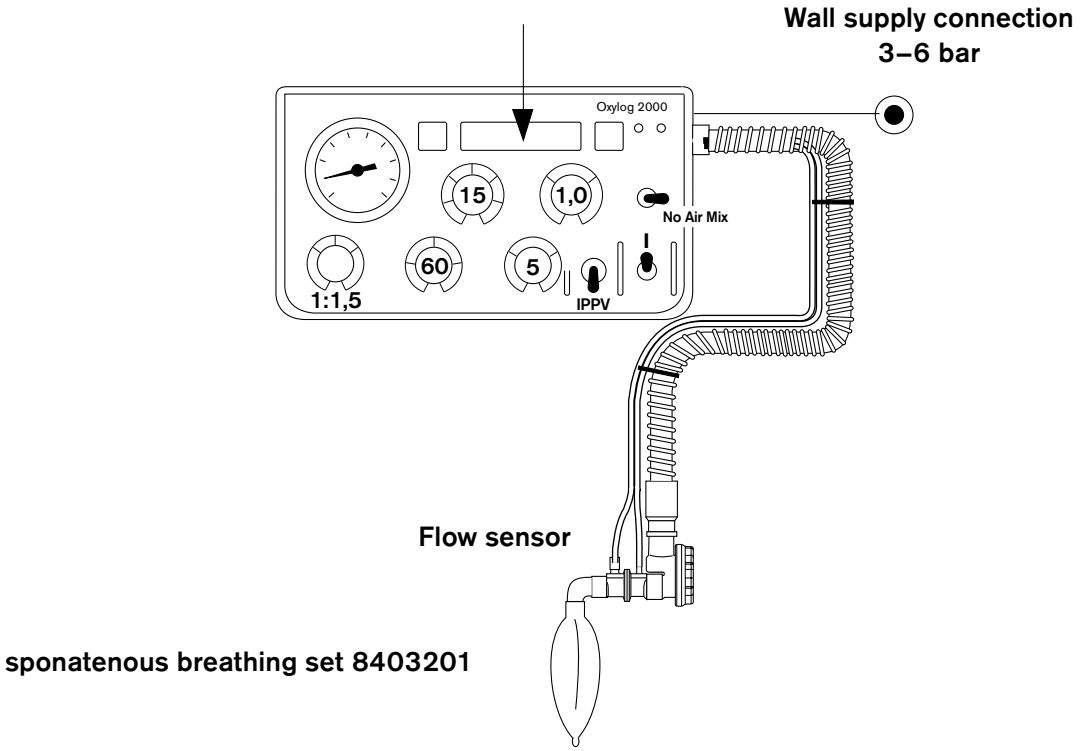
3.12 Test 022: Testing the Differential Pressure Sensor ΔP and Testing the Flow Measurement

This test allows you to adjust a simple ventilation pattern. No alarms are given during this test. You can toggle between the minute volume (Nom. and Act.) and the tidal volume (Insp and Exp) on the display.

Test Setup



- Set the mode switch to **IPPV**.
- Select the Extended Service Mode (ESM).
- Press the **Reset** key or the **Info** key to select Test 022.
- Press the **Info** key and the **Reset** key simultaneously to activate Test 022.
- Adjust the frequency to 15 min^{-1} and the V_T to 1 L/min.

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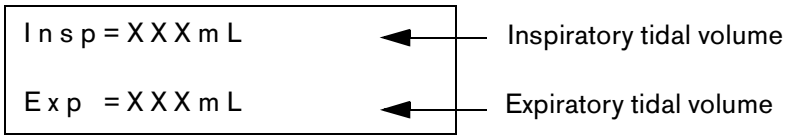
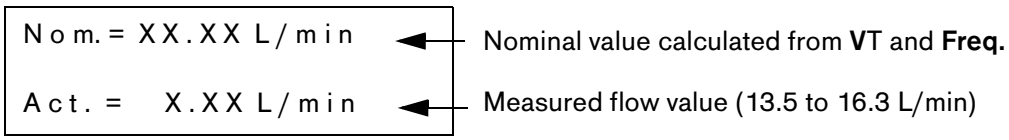
Display:



- Press the **Reset** key to display the current tidal volume (the last applied respiratory stroke).

Display:



- Press the Info key to display the actual tidal volume (the last given mechanical breath).
- Press the **Info** key and the **Reset** key simultaneously to return to the Extended Service Mode (ESM).

Exiting the Extended Service Mode (ESM).

- Switch Oxylog 2000 off and on again to return to the normal operating mode.

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4 Technical Error (TE) List

LCD Display:

18 00 00 00 00 UNIT INOP

Table 8: Possible Errors in Oxylog 2000

TE no.	Alarm	Cause	Remedy
1	A/D WANDLER TIMEOUT	Electronics	Replace electronics.
2	KONTR_5 V	Electronics	Replace electronics.
3	KONTR_VPFLOW	Electronics	Close solering jumper S3 on the Control PCB, otherwise replace electronics.
4	KONTR_VPAW	Electronics	Close solering jumper S4 on the Control PCB, otherwise replace electronics.
5	KONTR_VPSCHALT	Electronics	Replace electronics.
6	KONTR_VEXT	Incorrect ext. voltage	Check ext. voltage
7	TASTE_LCD_HG	Key sticks	Check, if necessary, replace the front plate
8	TASTE RESET	Key sticks	Check, if necessary, replace the front plate
9	BEIDE TASTEN	Key sticks	Check, if necessary, replace the front plate
11	POTI F	Resistance outside range, cable harness	Check the cable harness and the connector. If necessary, replace the front panel.
12	POTI VT	Resistance outside range, cable harness	Check the cable harness and the connector. If necessary, replace the front panel.

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Table 8: Possible Errors in Oxylog 2000

13	POTI IE	Resistance outside range, cable harness	Check the cable harness and the connector. If necessary, replace the front panel.
14	POTI_PMAX	Resistance outside range, cable harness	Check the cable harness and the connector. If necessary, replace the front panel.
15	EEPROM WRITE-ERROR	Electronics	Calibrate, otherwise replace electronics.
16	EEPROM CHECKSUMME	Electronics	Calibrate, otherwise replace electronics.
17	MV-valve	MV valve sticks	Check the cable harness, if necessary, replace the valve
18	POTI_MV	Tolerance	Check the cable harness, if necessary, replace electronics.
19	SW WATCHDOG	EPROM, electronics	Replace EPROM or electronics.
20	IRAM	Electronics	Replace electronics.
21	XRAM	Electronics	Replace electronics.
22	EPROM	EPROM	Replace EPROM
23	EEPROM PTC FEHLER	EEPROM	Replace electronics

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